Overview of DoD chromate usage and database

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Cr^{6+} usage in DoD

Cr^{6+} (CrVI, hexavalent chrome, chromate) is our primary corrosion

Cr^{6+}-containing coatings

- Chromate conversion coatings
- Chromate sealers
- Chromated primers
- Chromate washes
- Chromated metallic-ceramics

Cr^{6+} processes, non-Cr^{6+} coatings

- Hard chrome plating
- Chromic acid anodizing
- Chromic acid passivation

Cr^{6+}-containing coatings are a problem for sustainment (repaint, touch-up, corrosion control)

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Cr^{6+}-free coatings

ESTCP SERDP

Material	Status of alternatives
Chromate conversion coating	Trivalent chrome and non-Cr commercially available. Not yet as good as Cr^{6+}. Used on cars, Boeing 777, various military systems, USAF T.O. 1-1-8 Prekote;
Chromate primers	Non-Cr primers commercially available. Used on F-35, AH-64 Apache. Performance good on Cr^{6+} conversion coating. Moving toward total non-Cr^{6+}
Chromate finish system	Low temperature powder coat and UV curable finishes in validation to replace primer/topcoat for aircraft and vehicles.
Chromate conversion of Mg	Tagnite now used on EFV gearbox, some sumps, gearboxes for AH-64, CH-53. Performance much better than Cr^{6+} conversion and anodize. DoD use still very
Metallic-ceramics	Low-Cr and non-Cr available commercially. Performance uncertain
Chromate washes	Direct-to-metal used for MRAP. Poor performance

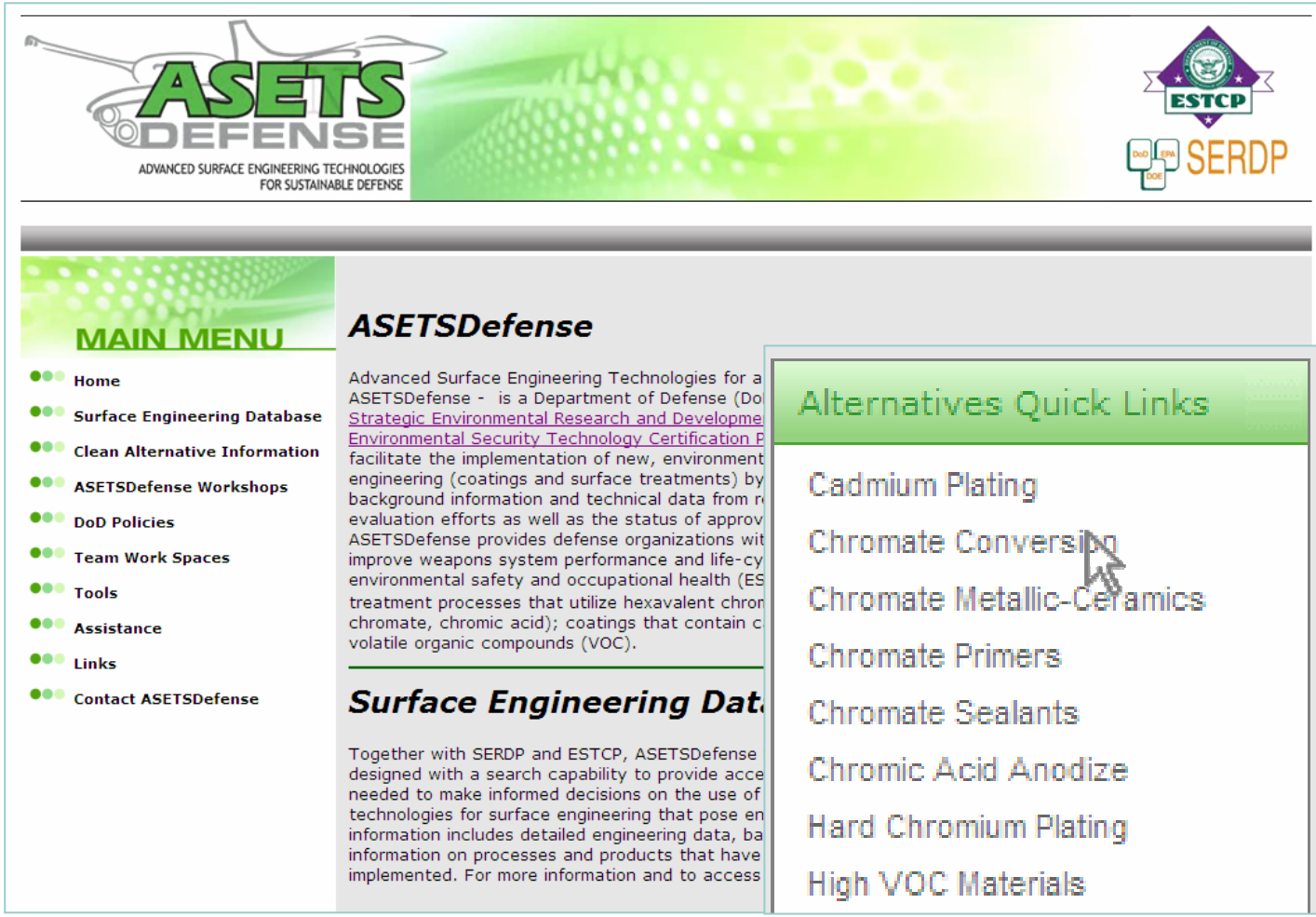
Cr^{6+}-free processes now in use

Material	Status
Hard chrome plating	HVOF on F-35 landing gear, all new commercial and military landing gear. Being implemented for
Chromic acid anodize	TFSAA approved by NAVAIR, BSAA by Boeing

ASETSDEFENSE SOURCES OF INFORMATION

ASETSDefense

http://www.asetsdefense.org



Quick information on alternatives

ASETSDefense workshop agendas, briefings, summaries (HCAT meetings coming soon)

Database

Team Work Spaces

Tools to be added

Quick Links basic information

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ESTCP
SERDP

MAIN MENU

- Home
- Surface Engineering Database
- Clean Alternative Information
- ASETSDefense Workshops
- DoD Policies
- Team Work Spaces
- Tools
- Assistance
- Links
- Contact ASETSDefense

Chromate Conversion Alternatives

Current Usage

Chromate conversion coatings and chromated sealers are used to create a self-healing conversion coating on Al and Mg alloys that is resistant to corrosion. They are also used for sealing electroplated and anodized coatings. These treatments are typically used prior to painting and finishing, since they generally improve adhesion of paints and sealants.

Typical Applications	Typical Chromate Conversion Coatings	Specifications
• Aircraft skins • Al frames for aircraft and vehicles • Mg gearboxes • Corrosion-resistant coatings (Cd, Al, ZnNi, etc.) • Anodize sealing • Fasteners and electrical connectors (Zn or Cd plated) • Wash primer for steels, armor	• Conversion and sealing coatings for Al (e.g., Alodine, Iridite, etc.) • Conversion and sealing coatings for Mg (e.g., Dow 7, 17, 19, HAE anodize)	• MIL-DTL-81706 • MIL-C-5541 • MIL-M-45202 • AMS 3171 • TO 1-1-8 • MIL-A-8625 • MIL-C-3171 • MIL-C-17711 • MIL-M-45202 • DOD-P-15328 • QQ-P-416

ESOH Issues

Cr^{6+} (CrVI, hexavalent chromium) is a known carcinogen that is strongly regulated under

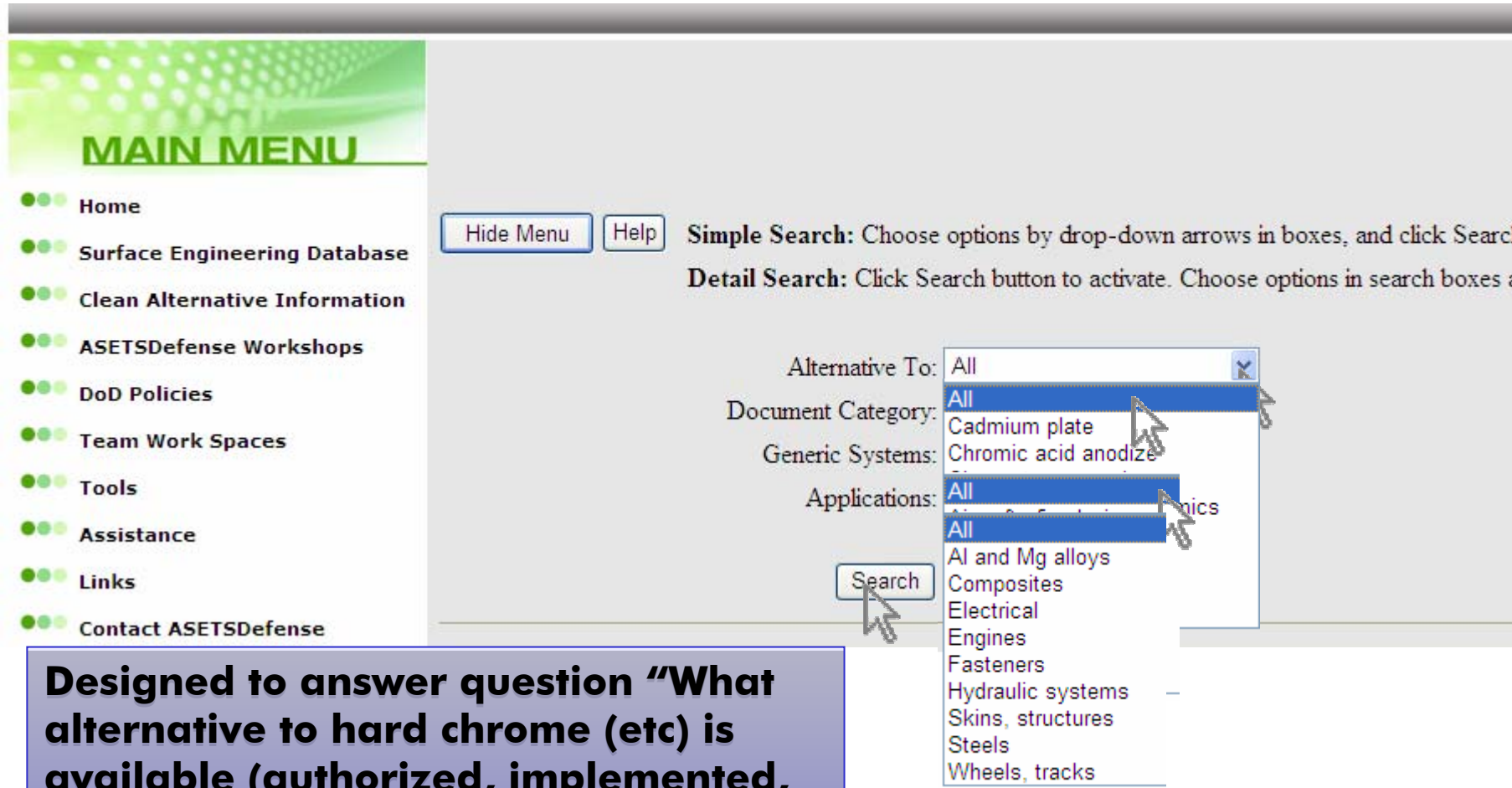
- EPA Clean Air Act rules
- OSHA Occupational Exposure to Hexavalent Chromium (Cr^{6+} PEL is currently $5\mu gm^{-3}$)
- European rules (RoHS, WEEE, ELV)

Exposure

Personnel may be exposed during manufacture, depot overhaul, repaint, and operational level touch-up and repair.

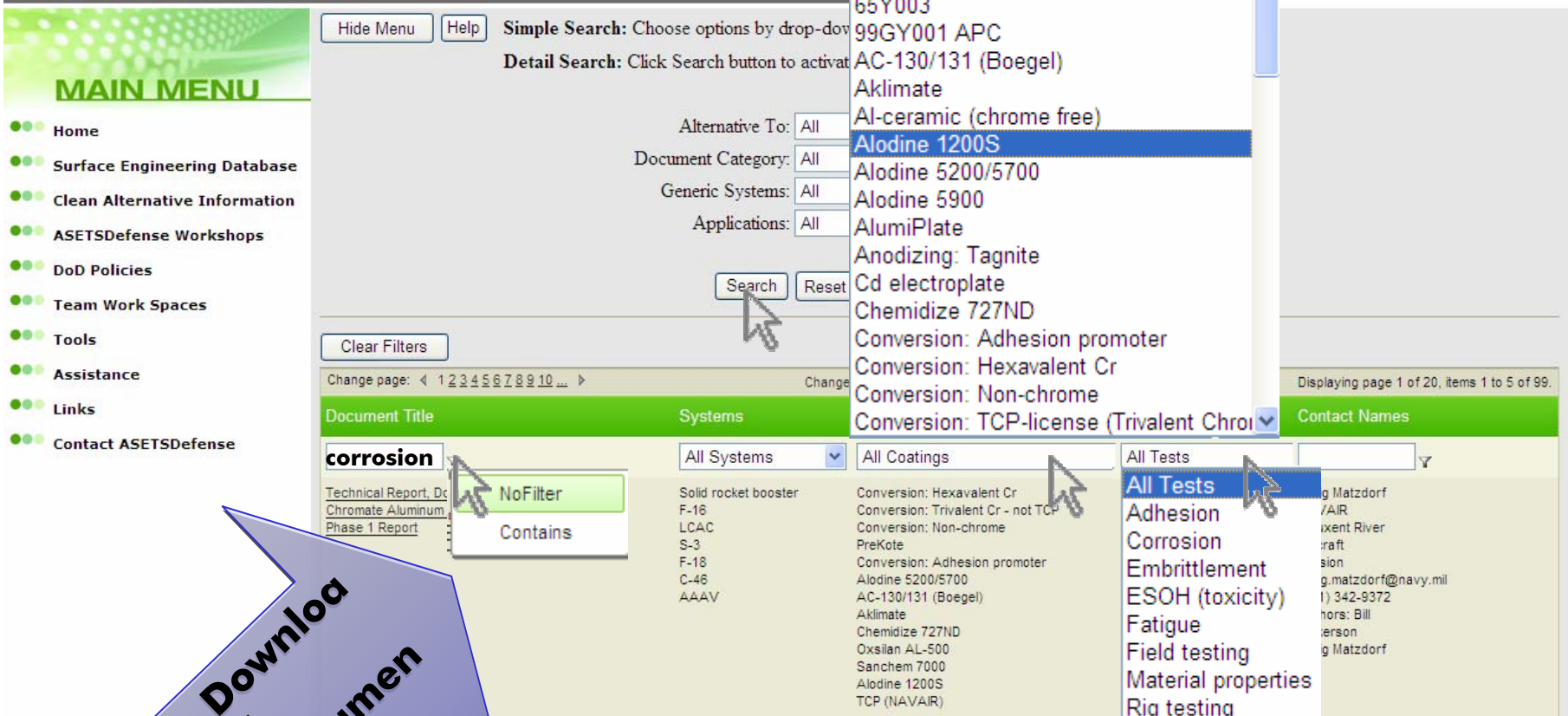
DATABASE

Database – Simple search



Designed to answer question "What alternative to hard chrome (etc) is available (authorized, implemented, spec'd) for my type of system and application?"

Detail search



Database Documents

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ESTCP SERDP

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To: Distribution

Subj: NAVAL AIR SYST
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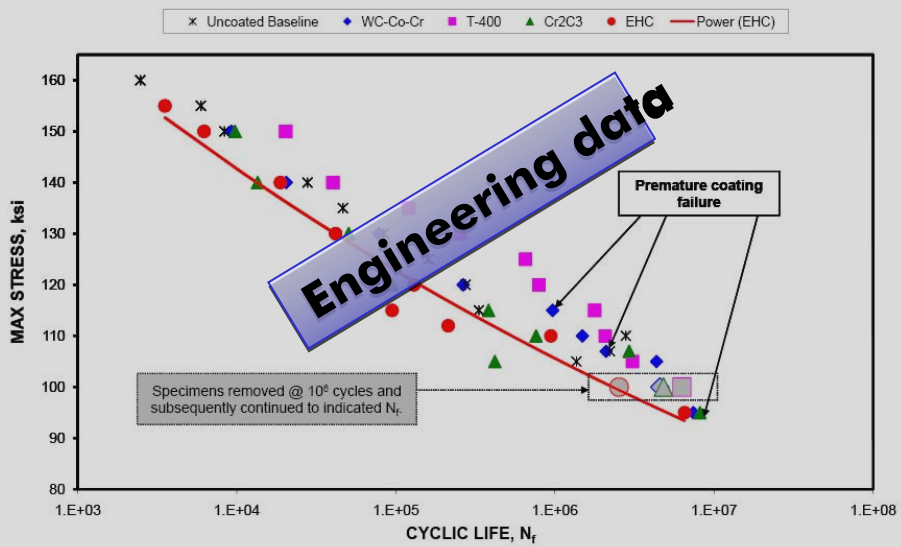
HCAT HYDRAULIC ACTUATOR FATIGUE PROGRAM
PH15-5 SUBSTRATE



Engineering data

15-5 PH Chart

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